NOTES FROM THE WOODS HOLE LABORATORY — 1917.

Edited by F. S. Collins.

(Plate 124.)

I. Species new to Science or to the Region.

The summer of 1917 proved quite fruitful in novelties at Woods Hole, and from the data and material submitted to me by Dr. I. F. Lewis, of the botanical staff of the Laboratory, I have made up the following notes. The fresh water material is from Wood Pond at Woods Hole, and from Tarpaulin Pond, near Tarpaulin Cove, Naushon, Elizabeth Islands. Miss Jane M. Furber has made a special study of the flora of the latter pond, both as to species found there, and as to seasonal variations; the results of her study will be published later, and I here include from this station only species new to science or to this region. A new species of *Erythrotrichia,* from Woods Hole, collected by F. G. Gustafson, is described on the following pages by Ralph E. Cleland. A new genus of Conjugatae is of importance enough to justify a special paper, which will soon be published by Dr. Lewis, who detected it in material from Wood Pond.

Chroococcus limneticus Lemmermann, Beiträge zur Kentniss der Planktonalgen, II. Bot. Centralblatt, Vol. LXXVI, p. 153, 1898. This is common in both Wood and Tarpaulin Ponds, among other algae. The cells are 8–13 μ diam., aeruginous; the tendency to division is considerably less in one direction than in the other two, and as the cells remain much in the position assumed on dividing, the result is a Merismopedium-like frond in surface view; the cells are similarly placed, quadrately, but the outline of the frond is irregular, not square as in *Merismopedium;* moreover any large colony is at least two cells thick. It was reported from Lake Erie by Miss Julia W. Snow, The Plankton Algae of Lake Erie, Bull. U. S. Fish Com., p. 392, 1908, but has not been recorded in this part of the country.

Microchaete **naushonensis** n. sp. Filamentis non attenuatis nec incrassatis, rectis vel subflexuosis, interdum erectis, vulgo prostratis; trichomate 6–7 μ diam., purpureo, longitudine cellularum diametrum aequante, paullo plus vel minus; cellulis inferioribus cylindricis, indistinctis; superioribus subrotundatis, moniliformibus; vagina

tenui, membranacea, aequali, hyalina; heterocysta basali globosa, vel superne subapplanata, 5–6 μ diam., interdum solitaria, vulgo sub heterocysta cylindrica, apicibus rotundatis, 7–8 × 10–17 μ, haud raro duo, raro tres seriatis super heterocystam basalem; heterocystis intercalaribus? sporis?

Filaments neither thickened nor attenuate, straight or subflexuous, sometimes erect, usually prostrate; trichome 6–7 μ diam., cells as long as broad or slightly more or less; lower cells cylindrical, indistinct; upper cells rounded, moniliform; sheath thin, membranaceous, even, hyaline; basal heterocyst globose, or somewhat flattened above, 5–6 μ diam., sometimes solitary, commonly below a cylindrical heterocyst with rounded ends, 7–8 × 10–17 μ, frequently two, rarely three such heterocysts in a series above the basal heterocyst. Intercalary heterocysts and spores not observed. On leaves of *Sphagnum* and other water plants, occasionally on *Oedogonium*, Tarpaulin Pond, August, 1917, ***Miss J. M. Furber***. Type in Collins herbarium.

On the *Sphagnum* leaves the prostrate filaments usually run lengthwise, either up or down; often two basal heterocysts will be in close contact, the filaments of both forming a straight line, giving the effect of one filament with two intercalary heterocysts. On *Oedogonium Borisianum* the filaments wind spirally about the host filament. *Hapalosiphon pumilus* and *H. hibernicus* occur with it, but lack the purplish shade of the *Microchaete*, and of course are amply distinct in branching.

BULBOCHAETE **Furberae** n. sp. Dioecia, nannandria, gynandrospora; oogoniis depresso-globosis, sub seta terminali, patentibus (interdum adparenter erectis); dissepimento infimo; oosporae episporio scrobiculato; androsporangiis sparsis, 1–9-cellularibus, nannandriis ad oogonium, antheridio interiori, stipite valde curvato, antheridio breviore.

Dioecious, nannandrous, gynandrosporous, oogonium depressed-globose, below terminal seta, patent (sometimes apparently erect); dissepiment very low; epispore of oospore scrobiculate; androsporangia scattered, 1–9-celled nannandria on oogonium; antheridium interior, stipe strongly curved, shorter than the antheridium.

Wood Pond, Woods Hole, Massachusetts, Aug., 1917. ***Miss J. M. Furber & I. F. Lewis***. Type in Collins herbarium.

Veg. cell,	10–15 μ diam., 3–5 diam. long.
Oog.	36–43 μ diam., 27–34 μ long.
Andr. cell,	9–10 μ diam., 8–9 μ long.
Nann.	7–8 μ diam., 20–25 μ long.

The oogonium is occasionally on one of the lower cells of a branch, but more commonly on the upper cell; usually this cell bears a seta

and the oogonium is patent, but not infrequently the seta does not develop, and in that case the oogonium is regularly erect. The nearest relative seems to be *B. Brebissonii*, but that species has larger dimensions, fewer-celled androsporangia, and less curved dwarf males.

B. ELATIOR Pringsheim, not before recorded for America, also occurs in the Wood Pond material, and is of much the same dimensions as *B. Furberae*, but has oogonia more angular and with smooth epispore, and androsporangia epigynous. *B. intermedia* var. *supramediana* Hirn, already known in Massachusetts, also occurs, but it is a plant of larger dimensions than *B. Furberae*, with relatively shorter cells and higher dissepiments.

MIKROSYPHAR PORPHYRAE Kuckuck, Bermerkungen zur marinen Algenvegetation von Helgoland, II, p. 381. This forms minute brown dots in the fronds of *Porphyra umbilicalis* (L.) J. Ag., ultimately destroying the infested portion of the latter, leaving a perforation in place of the *Microsyphar* colony. The filaments wind between the large cells of the host, branching more or less freely, with no erect filaments and no hairs. The fructification is of the simplest type, a single zoospore forming in the terminal cell of a branch, or a few zoospores forming each in a small cell partitioned off in such a terminal cell, constituting a very rudimentary plurilocular sporangium. It is fairly common, with various other epiphytes and parasites, at one or two stations at Woods Hole, and has not before been reported in this country.

NOSTOC PUNCTIFORME Hariot ex Bornet & Flahault, Revision des Nost. Het., part IV, p. 189, 1888, was found throughout the summer at Tarpaulin Pond. It is so closely associated with *Sphagnum* sp. that it may be called symbiotic. Sometimes it is found on the surface of the leaves, but more usually it occurs inside the dead and otherwise empty cells so characteristic of *Sphagnum*. It is also found in the cells of the stem. The *Sphagnum* does not react visibly to the presence of the *Nostoc*. *N. punctiforme* has been recorded, Forti, Syll. Myx., p. 388, as widely distributed in Europe, South America and the oceanic islands of the tropics as an epiphyte and endophyte on *Lemna*, in *Gunnera* and several lichens, and also on moist earth. From the United States it has been reported, Tilden, Minnesota Algae, p. 164, only as an endophyte in the roots of cycads, where it is associated with nodule formation and with a peculiar mode of growth of the roots.— F. S. COLLINS, North Eastham, Massachusetts.

II. A NEW ERYTHROTRICHIA FROM WOODS HOLE.

Erythrotrichia rhizoidea, n. sp. Thallus filamentoso-teres, roseus v. roseo-purpureus, rectus, 1–4 mm. longus, 10–50 μ diametro. Basis rhizoidalis, ex qua breves recti thalli secundarii nascuntur. Sporae roseae, 8–10 μ diametro.

Thallus dark red to reddish-purple, upright, terete, 4 mm. long at most, usually 1–2 mm. in length; 10 μ in diameter at base, increasing to 40–50 μ above; dividing at base into several short, irregularly down-growing rhizoidal filaments, which penetrate into the tissue of the host, and from which arise often one or more secondary thalli, rarely approaching the primary thallus in length, usually much shorter. Cells roundish-polygonal, 10–20 μ in diameter, dividing above in both horizontal planes into 4–8 cells. Spores reddish, 8–10 μ in diameter. Sexual organs not observed. Growing on *Porphyra umbilicalis* in the harbor of Woods Hole, Mass. Abundant. August, 1917.

This species differs from *E. Bertholdii* Batt. (= *E. ciliaris* Berth., but not *Bangia ciliaris* Carm., according to Batters) [1] in its smaller size, the presence of secondary upright thalli, and the rhizoidal nature of the holdfast. *E. Bertholdii* Batt. is attached merely by its slightly expanded basal cell.

It differs from *E. discigera* Berth.,[2] in that it has no definite basal disc as holdfast, and the holdfast is never seen without filaments attached.

Differs from *E. ciliaris* Batt.,[1] the species that Batters considers to be the original *Bangia ciliaris* of Carmichael, in the absence of a basal disc. In *E. ciliaris*, also, the erect filaments all appear to be of about the same strength and length. In our species, however, only one filament attains to any length, the others, when there are others, being usually very short.

E. obscura Berth.[2] does not fit our species in the following respects:— 1. Its blackish color. 2. When there are more than one series of cells, they lie in one plane. 3. The erect frond may have branches at the base, but no rhizoids. 4. The holdfast is in the nature of a basal disc. 5. In summer, the basal discs are very usually found bearing no erect filaments.

[1] Batters, E. A. L. New or Critical British Marine Algae. Journal of Botany, Vol. 38, pp. 369–379.

[2] Berthold, G. Die Bangiaceen des Golfes von Neapel. Fauna u. Flora des Golfes von Neapel, Vol. VIII, Leipzig, 1882.

We seem here to be dealing with a new species. Its main points of difference from previously described species lie in the rhizoidal nature of the holdfast; the marked differentiation of erect filaments into one primary and several secondary ones; the fact that the secondary filaments develop, not from the main thallus, but from the rhizoids; and the fact that holdfasts have not been seen without erect fronds. The reason for this latter fact appears to lie in the nature of the development from the spore. The spore, upon germination, gives rise to an upright filament which later becomes the primary thallus. When this is only a few cells in length, the lowest cell appears to swell and puts forth two or three filaments downward into the host tissue. The holdfast develops later therefore than the primary thallus. Any secondary filaments that may appear arise as buds from these rhizoid-like structures.

No sexual reproduction has been observed in this plant, but spores are produced in the manner characteristic of the genus.— Ralph E. Cleland, University of Pennsylvania.

Explanation of Plate 124.

Fig. 1. Bulbochaete Furberae; erect oogonium. × 485.
Fig. 2. " " patent oogonium. × 485.
Fig. 3. " " immature oogonium with two dwarf males. × 485.
Fig. 4. " " oogonium slightly more developed, with five dwarf males. × 485.
Fig. 5. " " androsporangium. × 485.
Fig. 6. Erythrotrichia rhizoidea; holdfast. × 455.
Fig. 7. " " secondary thallus arising at base of primary thallus. × 485.
Fig. 8. " " formation of spore. × 455.
Fig. 9. " " escaping spore. × 455.

Figs. 1–5 are by I. F. Lewis; 6–9 by R. E. Cleland.